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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/916,247
Filing Date: July 30, 2001
Appellant(s): COTE ET AL.

James A. Raakman
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 7/25/07 appealing from the Office action mailed 2/26/07.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

This application was remanded to the examiner after a decision on Appeal 2006-2492, February 16, 2007.

Appeal 2007-1768 on Application 10/377,647, a CON of this application, the Examiner was affirmed on August 27, 2007.

Appeal 2006-2898 on application 10/461,687, a CON of this application, was remanded to the examiner on February 28, 2007.

Appeal 2007-0362 on application 09/425,234, a related application, the examiner was affirmed on March 23, 2007.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 6,331,251	DEL VECCHIO	DECEMBER 2001
US 5,403,479	SMITH	APRIL 1995

US Patent Application 11/106,681 filed 4/7/06 with preliminary amendment on 5/15/07

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Double Patenting

The provisional double patenting rejection under 35 U.S.C. 101 of Claims 26-29, 31 and 33 as claiming the same invention as that of claims 1-6 of copending Application No. 11/106,681 is hereby withdrawn, since appellant cancelled claims 1-6 in 11/106,681 by amendment of 5/15/07.

Claims 26-36 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 7-23 of copending Application No. 11/106,681. This rejection is hereby withdrawn because appellant filed a terminal disclaimer over 11/106,681 on 5/25/07.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 26-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al (US 5,403,479) in view of Del Vecchio et al (US 6,331,251).

Smith (479) teaches a process of filtering water containing solids by immersing a membrane in a tank at ambient pressure (col 2 lines 63-66 and col 1 lines 53-66) containing the water and providing a trans-membrane pressure, with permeate side subjected to a negative pressure relative to the feed side for the filtration (Fig 2,7; col 15 line 63-col 16 line 10; see abstract of the reference incorporated in col : US, 5,248,424 to Cote. Et al.), with the permeate side connected to permeate outlet (line 22, and tank 27, fig 2), the membrane aerated (col 16 lines 20-25), backwashing, with wetting the membrane at least once a week (periodicity of this step can be seen in Fig 4) with a cleaning fluid of select concentration, periodically for a select period (col 15 table, lines 16-47, col 18 lines 13-29; col 11 lines 22-61).

Re the limitations 'and a retentate in the tank', it is inherent; what remains in the tank is 'retentate' after 'permeate' is removed from the feed by the process.

Backwashing is done after the permeation step (see col 11 lines 22-61).

Regarding the draining of the tank wholly or partially, and during or after backwashing, Smith discusses about draining the tank in detail during cleaning in the "back-ground of the invention", but teaches that draining the tank can be eliminated during the cleaning process if the use of the cleaning agents is controlled so as not to affect the permeate quality (col 10 lines 64-68, col 11 lines 22-61). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998). Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments (In re *Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971)). "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use. In re Gurley, 27 F.3d 551, 554, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). Also, a reference is no less anticipatory if, after disclosing the invention, the reference then disparages it. The question whether a reference "teaches away" from the invention is inapplicable to an anticipation analysis. *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998).

Regarding when to drain the tank, the 'Markhush group' claim language "either before the other or partially or simultaneously" covers all the possibilities there are: before, during or after the cleaning step, and fully or partially; and therefore, if not

anticipated by Smith, would be obvious to one of ordinary skill in the art. Please see the Del Vechio reference as further evidence to this prima facie case.

Del Vechio teaches the process as claimed in claim 26 (for details, see the rejection in paragraph 4 below), including the draining step. Del Vachio subsequently teaches that the draining of the tank [of the cleaning solution] can be avoided and directly proceeded to normal operation if the cleaning solution is consumed or neutralized during the cleaning operation, or if its toxicity would not unduly inhibit the activity of the bio-mass.

Smith's teaching is a step farther: Smith teaches that by following his method there is no need to drain the tank at all; and his method reads on to claim 26 but for the draining step. It is respectfully submitted that draining the tank of its contents for cleaning purposes is well known in the art for ages; one of ordinary skill would assume draining the tank before cleaning, draining the tank of the cleaning chemicals and rinsing it as process steps that one would naturally follow. Smith teaches what is being followed in the industry, which includes draining the tank, and his process as an improvement where in he has determined that such draining is not necessary because the cleaning chemicals can be controlled so that it would not adversely affect the process or hurt the activity of the biomass (column 11 lines 22-61). Thus, if Smith does not anticipate the claim, it definitely would make it obvious.

In addition, one of ordinary skill in the art would also use the teaching of Del Vechio in the teaching of Smith to drain the tank of the wastewater (substrate) for

extreme rigorous cleaning when needed, and drain and rinse the tank and membrane after cleaning, if such cleaning would be detrimental to the biomass in the substrate.

Claim 27: The cleaning is between once a day and once a cycle (see fig 6; col 13 lines 50-57). Draining the tank would be obvious, as shown above.

Claim 28: The cleaning is carried out to maintain an acceptable permeability of the membrane as in instant claim 28 (col 13 lines 50 – 57, col 18 lines 5-12) and the cleaning steps from time to time is to increase the flux and reduce the rate of decline of flux in Smith (col 10 lines 64-68, col 11 lines 22-30). It would be obvious to one of ordinary skill in the art at the time of invention to optimize the cleaning cycles depending on the condition of the feed water, such as composition of the biomass, rate of growth of biofilm, etc., as taught by Del Vechio – see column 12, 12-47, and Smith.

Claims 29 and 30: The sum of the products of chemical concentration and duration of cleaning between 5,000 and 10,000 min.mg/L or equivalent for another cleaning chemical (col 11 lines 30-35: time less than an Hr, sufficient to diffuse enough cleaning solution ... ; table line 9: NaOCl at 100 ppm, col 15 lines 34-36: cleaning solution at 10 ppm; these provide the CT values within the claimed range of 2000-20,000 min.mg/L per week for at least one month). Also, these ranges are optimizable depending on the water quality and membrane flow rates. In re Boesch and Slaney.

Claim 31: recovery cleaning at least one month apart: Figure 4 gives more and less rigorous alternatives for cleaning over a 15-day period, and Smith teaches the

cleaning process as a periodic process (col 1 lines 18-22). It may be noted that the type and frequency of cleaning would depend on the water quality and the fouling characteristics of the membrane, and one of ordinary skill in the art could optimize it. Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Boesch and Slaney, 205 USPQ 215 (CCPA 1980); In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977); In re Aller, 42 CCPA 824, 220 F.2d 454, 105 USPQ 233 (1955).

Claim 32: permeate is used as drinking water: intended use of the product made: Smith ref teaches purifying "ground water" in col 20 lines 35-43. Ground water is well known as a source of drinking water. [Also, please note that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)]. Cleaning chemical is an oxidant – hypochlorite is an oxidant.

Claims 33-35: cleaning at regular intervals, mixing cleaning chemicals in flowing water in permeate side: see abstract and figures of Smith. Re mixing cleaning chemical in flowing water, Smith teaches flowing water containing the cleaning chemical, the cleaning chemical being mixed in the water in a feed tank, which is equivalent. Regarding backwashing with permeate after backwashing with cleaning chemical, see col 12 lines 56-68. Del Vecchio also teaches the same in column 11, 59-67, and column 12.

Claim 36: Membrane is hollow fiber in smith – see abstract.

2. Claims 26-28, 31 and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Del Vecchio et al (US 6,331,251).

Claim 26: Del Vecchio teaches a process of filtering water containing solids using immersed membranes (see abstract and figures) by creating a trans-membrane pressure with permeate side at a lower pressure as claimed, retentate remains in the tank (Please note that Del Vecchio uses the term "substrate" for the contaminated water to be cleaned). Membrane is aerated during normal operation and for cleaning (see column 6 lines 15-28, column 7 line 64 – column 8 line 5 and column 11 lines 9-31). Backwashing the membrane (reverse flow cause permeate to flow in the opposite direction) – column 11 lines 31-46. Draining the tank – column 11 lines 46-58. Tank is drained after the cleaning cycle also – see column 12 lines 40-48. (Claim language is open to cleaning at any time: during, before or after the backwashing cycle. Draining the tank before or after the deep cleaning in the reference happens after a backwash cycle). Pulsed cleaning can also be introduced during the deep cleaning – see column 12 lines 30-40: this would be back flush when the tank is in the drained state. The "wetting of the membrane with a cleaning chemical" is the soaking step in the reference – the membrane is wet with a cleaning chemical in this step. Column 11 lines 59-67, column 12 lines 12-30.

The reference teaches several process steps in the "deep cleaning" process, such as draining the tank, then soaking the membrane in a cleaning chemical solution,

for duration depending on the wastewater conditions (substrate, constituents of the biomass, and other factors), which can be repeated once a month, or more frequently as desired; additional steps of adding membrane air, and pulse cleaning with or without cleaning chemical. Of these, the soaking and the use of membrane air meets the recitation of steps (ii) and (f) of claim 26.

Regarding the frequency of cleaning, the reference teaches a frequency of about once a month, or at more or less frequent intervals, depending on the needs of the system and the rate at which the biofilm is generated on the fibers – see column 12 lines 12-30. Thus, even if the reference does not specifically teach once a week cleaning cycle, the frequency could be optimized for the process conditions, which would be obvious to one of ordinary skill in the art.

It would be obvious to one of ordinary skill in the art at the time of invention to increase or decrease the intensity, duration and frequency of cleaning required depending on the process conditions, such as the quality of the wastewater, composition of the biomass, rate of generation of the biofilm, and other factors, as taught by Del Vechio.

Claim 27: part (i) repeated at least once a day – see column 10 lines 4-8 (pulse cleaning is with backwash). Step (f) (wetting, or deep cleaning in the reference) is repeated, and duration and frequency can be selected depending on the need of the system – column 12 lines 12-30.

Claim 28, 31: recovery cleaning – the deep cleaning, or deep cleaning with additional back-flush cleaning (column 12 lines 30-40) can be recovery cleaning, depending on need. One month apart – column 12 lines 19-22. The claims do not recite any specific steps for the recovery cleaning. Applicant describes the recovery cleaning in paragraph (0008) of the Pre-Grant Publication as (that described in US patent 5,403,479 to Smith et al):

> "Permeation is stopped and the membranes are cleaned by continuously flowing a specified amount of chemical cleaner in a reverse direction through the membranes for an extended period of time while the membranes remain immersed in the wastewater and are simultaneously agitated."

This description only shows repeating the weekly cleaning cycle with more intensity and/or duration once a month. This resembles the Del Vechio teaching of the reference in column 12, 30-40. ***It would be obvious to one of ordinary skill in the art at the time of invention to increase or decrease the intensity, duration and frequency of cleaning required depending on the process conditions, such as the quality of the wastewater, composition of the biomass, rate of generation of the biofilm, and other factors, as taught by Del Vechio.***

Claim 34: back washed with permeate after step (f) – see column 12 lines 30-40. This step would be after "wetting" (or soaking – see column 12 lines 12-15) the membrane, and before returning to step (b). The reference also teaches draining the tank of the cleaning chemicals in column 12, lines 40-48. It would be obvious to one of ordinary skill in the art at the time of invention also to back flush with water to remove the cleaning chemical if required. The reference teaches that the cleaning chemical

remaining in the system could also be consumed or neutralized by the wastewater; the only requirement is that the it should not unduly inhibit the activity of the bio-mass.

Claim 35: flowing permeate to the permeate side – the reverse flow step in pulse cleaning. Mixing cleaning chemical in flowing permeate water – see column 11 lines 62-65: chemical is mixed into the permeate in line 292, which is the permeate line that can flow back into the tank through line 296, or to the permeate side of the membrane through line 294. Column 12 lines 30-40 teaches reverse flow of permeate with cleaning chemical.

Claim 36: Hollow fiber membrane – treatment system same as that of the applicant's – see column 1 lines 23-33.

3. Claims 29,30,32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Del Vecchio as applied to claim 26 above, and further in view of Smith'479.

Instant claims differ from the teaching of Del Vecchio in reciting the cleaning chemical comprising an oxidant, the range of the min.mg/L of the cleaning chemical and that the permeate is intended as drinking water. Permeate intended as drinking water is intended use of the product made, and is not a patentable limitation. See, e.g., In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963) (The claims were directed to a core member for hair curlers and a process of making a core member for hair curlers. Court held that the intended use of hair curling was of no significance to the structure and process of making.). Del Vechio teaches using chlorine as preferred, which is an oxidant (column 9 lines 43-48). Smith teaches using chlorine or

hypochlorite as cleaning chemical in a similar process – see column 12 lines 9-25, column 15 lines 1-47, and examples. It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Smith in the teaching of Del Vecchio for the cleaning chemical because Del Vecchio does not specify a composition for the cleaning chemical, and Smith provides the details of the use of the cleaning chemical for the same or similar process. Also chlorine and hypochlorite are equivalent in their oxidation action – both work by releasing nascent oxygen to oxidize the bio-foulants.

Claim 33: Step (f) performed at regular intervals with same product of concentration and duration – this is implied in column 12 lines 10-30. "[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968); In re Lamberti, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976).

(10) Response to Argument

I. Statutory Double Patenting:

Appellant has cancelled claims 1-6 in the application 10/106,681 by amendment on 5/15/07. Therefore, this rejection is now moot, and is hereby withdrawn.

II. Obviousness-type Double Patenting

Appellant filed a Terminal Disclaimer over 10/106,681 on 5/25/07. Therefore, this rejection is hereby withdrawn.

III. Rejection of claims 26-36 over Smith in view of Del Vecchio:

Claim 26:

Appellant's arguments list three alleged deficiencies in the rejection in an attempt to show that the rejection is improper. However, ***no arguments are presented to show patentability over the prior art cited***.

The three argument points listed pertains to:

(a) Whether the Smith reference was improperly characterized as merely stating that a step of draining the tank can be eliminated, or whether Smith teaches draining the tank as undesirable, and not part of his inventive process?

(b) Whether the Examiner improperly applied various case laws on anticipation to ignore Smith's teaching against draining the tank, and is it contrary to the obvious combination of Smith and Del Vecchio? And,

(c) whether element (f) of claim 16 [sic; 26] not taught by either of the references?

With respect to argument (a), the argument that Smith teaches draining the tank as "highly undesirable" is an inaccurate statement. The portion appellant quoted from Smith is actually teaching about the drawback of cleaning from outside of a frameless array, which needs to be taken out for cleaning from outside. The alternate to this process is to drain the tank, fill with cleaning solution, and then drain the cleaning solution and refill the tank, which is taught as undesirable (not just draining the tank as highly undesirable). Smith's invention is cleaning the membrane by backwashing or pulsed back-flushing in controlled conditions, so that the amount of cleaning chemicals released is not detrimental to the permeate or the biomass, and therefore, draining the tank after cleaning becomes unnecessary.

However, the Examiner agrees that draining the tank is not Smith's inventive process. The Examiner also agrees that Smith teaches eliminating the draining step, because it is undesirable. However, how would this argument make appellant's claim 26 patentable?

The step 'e) ii)' in claim 26, "either before the other or partially or simultaneously", means that draining may be done any time during the cleaning process, i.e., before, during or after the backwash (Further explanation of this interpretation is given in section IV below, under the rejection over Del Vecchio). Appellant admits that draining the tank before the chemical backwash was known in the art – see specification at page 3, lines 7-11:

> "French Patent No. 2,741,280 describes a method of backwashing significantly fouled membranes with a chemical cleaner continuously for at least 30 minutes. The tank water is empty during the chemical backwash. When the chemical backwash is over, the cleaner is drained from the tank and the tank is refilled. "

With respect to Appeal 2006-2492 on the 35 USC 102(b) rejection of the claims over Smith, Board's decision stated that the Examiner has not carried out the burden of making out a prima facie case of anticipation by pointing out where each and every element of the claimed invention arranged as required by the claim is described in the reference. This, the Examiner believes, was with respect to the step of draining the tank. The Examiner believes that, in response to Board's remand to look at the possibility of obviousness of the claims over the cited references, a prima facie case of obviousness is established over Smith in view of Del Vecchio, which Appellant has failed to overcome.

Appellant's argument of "Smith teaches away" is also not convincing, because what Smith teaches is a process in which the tank draining step can be eliminated by having a controlled use of the cleaning chemicals. The significance of Smith invention is clear from the lines (column 11, lines 51-61):

> "The amount of cleaning fluid discharged into the feed is so small with each cleaning cycle that, even after an arbitrarily large number of cycles greater than 1000, continued withdrawal of permeate from the feed contaminated with cleaning fluid, does not deleteriously affect the permeate quality. In all cases diffusion through the wall of the membrane under diffusion-controlled flow occurs in a surprisingly short time, which provides for a short cleaning period; and a short cleaning period is a critical factor in the commercial attractiveness of a membrane separation."

With respect to argument (b), The Examiner does not believe that the cited case laws are strictly only for anticipation, and that they would fall apart if applied to an obviousness situation. However, even if the case laws were assumed to be absolutely inapplicable to an obviousness situation, applicant has not shown how the claims are patentable over the references. Given that Smith teaches the then well known step of 'draining the tank after cleaning' as undesirable and unnecessary, how would adding that step to Smith's teaching make the claims patentable? Appellant has not made any argument about the positive attributes of having the draining step over eliminating the draining step, nor any evidence of unexpected results or other evidences of patentability over the prior art.

On the other hand, the rejection has clearly demonstrated that, in addition to the fact that draining the tank is a well known process and that draining the cleaning chemicals would naturally follow a cleaning process, there is a convincing evidence to add the draining step in Smith in situations wherein the cleaning required was harsh and excessive, and/or the cleaning chemicals used are deemed detrimental to the biomass in he system.

Argument (c) that the Examiner did not establish that element (f) of claim 26 was disclosed in or made obvious by either of the cited references:

Step (f) recites wetting the membrane at least once per week with a cleaning chemical after or during draining the tank. This step in combination with step (e)(ii), the wetting can be before, during or after draining the tank.

Smith teaches wetting the membrane with cleaning chemicals – column 11, lines 1-61. Specifically, at least once a week – see the example represented by figure 4. Del Vecchio teaches wetting the membrane once a month, or with more or less frequency, as needed. Therefore, this argument is baseless.

Argument that Smith has 9-day gap between data points 1 and 5: this is also not persuasive because, all steps 1-6 are cleaning steps; some use RO water or permeate. RO water and permeate are also cleaning chemicals. Water is a chemical compound; it is used in cleaning. Moreover, RO water is highly pure water, and therefore, is a very effective cleaning agent.

About the argument that Del Vecchio teaches cleaning only once a month is not convincing either, because Del Vecchio clearly teaches 'more or less than once a month', and that it is optimizable, depending on the needs of the system and the rate at which biofilm is deposited on the membrane.

Claim 27: The issue of draining the tank is addressed in the rejection and above for claim 26. The same grounds apply for claim 27 as well. The frequency required can be optimized depending on the quality of the feed water and the rate of growth of the biomass as taught by Del Vecchio.

Claim 28: Claim 28 adds "recovery cleaning" from time to time in addition to the steps of claim 26.

First of all, the Examiner would like to state that the "recovery cleaning" is not clearly differentiated from the cleaning steps of claim 26, which makes this claim indefinite. In fact, there is no explanation of what constitutes "recovery cleaning" compared to the cleaning steps of claim 26. A similar situation, wherein the claims 6-10 of application 09/425,234 claimed a "more intensive first cleaning", which was judged indefinite under 35 USC 112, second paragraph, by the Board in Appeal 2007-0362. Appellant describes recovery cleaning as that described in the Smith patent in paragraph 0008 of the Pre-Grant Publication, which is not different from what is recited in claim 26.

The Examiner believes that assuming the recovery cleaning to be a some what more intensive cleaning than that afforded by claim 26, like stronger chemicals, more concentrations, longer periods, temperature, etc., such added steps are obvious. Both Del Vecchio and Smith teach varying the degree of cleaning as required, or the process conditions dictate.

Claims 29 and 30: Weekly CT values – if the references do not actually teach the values, or if they are not determinable to be within the exact range of values as claimed, they are optimizable variables. They can be optimized based on the degree of fouling or growth of biomass on the membrane, the through-put of the system, quality of feed, membrane flux, etc.

Claim 31: As in claim 28, the recovery cleaning is not clearly defined and differentiated from the cleaning steps of claim 26, and therefore, is indefinite. However, the examiner is not making a new rejection at this time and leave it to the discretion of the Board. The recovery cleaning, assuming it is more intensive than that presented in claim 26, can be optimized as shown in the rejection.

Claim 33: claim 33 really does not add any further limitation to claim 26. Argument about weekly CT is not commensurate with the scope of the claim.

Claim 34: Appellant has differed the argument to the arguments presented in the rejection over Del Vecchio.

Claims 32, 35, 36: there are no separate arguments presented to show patentability of these claims.

IV. Rejection of Claims 26-28,31 and 34-36 as obvious over Del Vecchio:

Claim 26:

The Examiner disagrees with appellant's restating of claim 26 as:

"Claim 26 requires, among other things, wetting membranes with a cleaning chemical, while or after draining a tank of retentate, at least once a week."

Because claim 26 recites wetting membranes with a cleaning chemical ***before, during or after*** draining the tank of retentate as shown below:

Interpretation of step (f) of claim 26:

f) wetting the membranes at least once per week with a cleaning chemical having a selected concentration for a selected duration after performing step (b) in a first cycle and after or while performing step (e) in the first cycle, without returning to step (b) in the first cycle and before starting a subsequent cycle. [underline added]

Step (f) is performed after or while performing step (e). Step (e) recites:

e) draining the tank of the retentate; wherein i) the steps above are performed in repeated cycles; and, ii) the steps of backwashing the membranes and draining the tank in a cycle may be performed either before the other or partially or substantially simultaneously; and, [underline added]

The underlined portion of step (e), "either before the other or partially or substantially simultaneously" would mean that the step of backwashing can be before draining, after or during draining. "Either before the other" is interpreted as "one before the other", and can be backwashing before draining, or draining before backwashing.

Thus when wetting is done while performing step (e), and backwashing as in step (e) could also be before draining, wetting with the cleaning chemical can be before, while (during) or after draining.

Arguments traversing this rejection is directed at the frequency of wetting with a cleaning chemical. Appellant's contention is that according to the decision on Appeal 2006-2492, a frequency of at least once a week was not established from the teaching of the reference.

The "deep cleaning" is recognized by the reference as a variable; the Board decision also recognizes this fact. The question whether this is a result effective variable is also answered by the reference: it teaches that it can be varied depending on the needs of the system and at the rate at which the bio-film is generated on the fibers. Rate at bio-film is generated on the fibers would depend on the bioactivity or the concentration of biomass, and other suspended solids in the water ('substrate' in reference), the rate of processing, and the membrane characteristics (such as some membranes foul faster than others). Thus it is a result effective variable, and therefore, can be optimized.

Argument that 'Del Vecchio has a starting point of one month, the deep cleaning would interrupt the normal operation for several hours, and therefore, a person skilled in the art would seek to interrupt the process as infrequently as possible', are not persuasive. Del Vecchio clearly teaches "more or less frequent intervals". The duration of cleaning is also "preferably several hours and preferably as long as four hours or longer". Thus it can be less preferably for shorter time periods. Del Vecchio does not teach anywhere that the first deep cleaning should be only at or after one month. Appellant's cleaning frequency is once a week, which is not a significantly shorter time period than 'once a month ... or more ... frequent intervals', and would clearly fall in the range of 'once a month or more frequent intervals'. And Del Vecchio's teaching clearly shows that if the bio-film growth on the membrane is faster, the membrane can be cleaned more frequently. Having about four hours of down time for cleaning a week would not be a disincentive for one skilled in the art when the water to be treated is high in concentration of waste matter such as, for example, sewage.

Appellant's arguments such as "a process which is implemented before the membranes foul significantly, to reduce the frequency of intense cleaning procedures such as the "deep cleaning" in Del Vecchio" are not commensurate in scope with the claim.

Claim 27: The Examiner finds no reason to believe that the optimization of the cleaning frequency of claim 26 to once a day is not feasible. Depending on the nature of the 'substrate' (or water) to be treated and other process conditions, cleaning frequency can be increased to once a day. Any argument to the effect that several hours of cleaning a day is undesirable for one of skill in the art from Del Vecchio's teaching would not be commensurate in scope with the claim or the rejection, because the claim does not recite any specific duration of the cleaning cycle; "several hours a day" is taught as preferable, which means that shorter non-preferable durations are also contemplated in Del Vecchio; Del Vecchio suggests optimizing the cleaning frequency as shown in claim 26 above; and even several (or four) hours of cleaning cycle time in a 24-hour-day is feasible. Regarding the pulsed cleaning, they provide the added steps as contemplated by step (f) repeating between once a day and once a cycle.

Claims 28 and 31: As pointed out above, under the rejection over Smith in view of Del Vecchio, the subject matter in claims 28 and 31 appear to be indefinite, because appellant has not provided any clear definition how the recovery cleaning is different from the recitation of claim 26. For the purpose of examination, the definition of recovery cleaning as it appeared in paragraph [0008] of appellant's Pre-Grant Publication was used. This is the only place where any definition of "recovery cleaning" is provided.

The recovery cleaning is defined as "continuously flowing a specified amount of chemical cleaner in a reverse direction through the membranes for an extended period

of time while the membranes remain immersed in the wastewater and are simultaneously agitated". This is not different from what is in claim 26: aerating, backwashing and wetting the membrane with chemical cleaner while performing step (e). Del Vecchio teaches in column 12, lines 30-40, a combination of pulsed cleaning with a cleaning chemical through the interior of fibers in a reverse flow while deep cleaning to accelerate elimination of bio-mass from fiber surfaces. Thus Del Vecchio teaches additional process steps as necessary. This would make the claim obvious, because one of ordinary skill in the art could pick and choose how frequently, and different kinds of cleaning steps for cleaning the membrane. Thus one could have repeated simple cleanings, event cleanings, deep cleanings, recovery cleanings, intensive cleanings, more intensive cleanings, total cleanings, or any other type of cleanings, as one wishes.

Claim 34:

Del Vecchio teaches neutralizing or consuming the cleaning chemical as stated in the rejection. An additional step of backwashing with permeate is not patentable, because it would be obvious to remove the cleaning chemical before resuming normal operation.

Claims 35 and 36: no arguments presented.

V. Rejection of Claims 29,30,32 and 33 as obvious over Del Vecchio in view of Smith:

Appellant has not made any separate arguments with respect to these claims.

(11) Related Proceeding(s) Appendix

Board decision on Appeal no. 2007-1768 on Application 10/377,647 is attached herewith. Copies of the other court or Board decision(s) identified in Related Appeals and Interferences section of this examiner's answer are provided by the appellant in the appeal brief.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

9/11/07

Krishnan S Menon
Primary Examiner
Art Unit 1723

Conferees:

/Romulo Delmendo/
Romulo Delmendo
Appeals Specialist

/David R. Sample/
David Sample
Supervisory Patent Examiner

The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte PIERRE COTE, HAMID RABIE, NICHOLAS ADAMS, HIDAYAT HUSAIN, HENRY BEHMANN, STEVEN PEDERSEN, and JASON CADERA

Appeal 2007-1768
Application 10/377,647
Technology Center 1700

Decided: August 27, 2007

Before BRADLEY R. GARRIS, CHUNG K. PAK, and JEFFREY T. SMITH, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from a final rejection of claims 16-25. We have jurisdiction under 35 U.S.C. § 6.

BRIEF STATEMENT OF THE INVENTION

Appellants' invention is directed to a method for cleaning one or more filtering membranes. The claimed method includes flowing a chemical cleaner in pulses through the membranes while the tank water is being drained or is below the level of the membranes. Representative independent claim 16, as presented in the Brief, appears below:

> 16 A method for cleaning one or more filtering membranes normally immersed in tank water containing solids in a tank and used to produce a permeate in one or more cleaning events, each cleaning event comprising the steps of:
>
> (a) stopping permeation;
>
> (b) draining the tank water from the tank to below the level of the membranes:
> and,
>
> (c) while the tank water is being drained or is below the level of the membranes, flowing a chemical cleaner in pulses through the membranes in a direction opposite to the direction in which water lean in solids normally permeates through the membranes;
> and,
>
> (d) refilling the tank,
> wherein,
>
> (e) the cleaning events are performed at least once a week; and.
>
> (f) the product of the concentration of the chemical cleaner expressed as an equivalent concentration of NaOCl in cleaning efficacy and the duration of all cleaning events in a week is between 2,000 minutes*mg/L and 20,000 minutes*mg/L.

The Examiner relies on the following references in rejecting the appealed subject matter:

Smith	US 5,403,479	Apr. 4, 1995
Del Vecchio	US 6,331,251 B1	Dec. 18, 2001

The Examiner entered the following final rejections:

I. Claims 16-25, stand rejected under 35 U.S.C. § 103 as obvious over the combined teachings of Smith.

II. Claims 16-25, stand rejected under 35 U.S.C. § 103 as obvious over the combined teachings of Del Vecchio and Smith.

DISCUSSION[1]

I. Claims 16-25, stand rejected under 35 U.S.C. § 103 as obvious over the combined teachings of Smith.

For this rejection, the issue is as follows:

Has the Examiner reasonably determined that a person having ordinary skill in the art would have been led to perform a method for cleaning one or more filtering membranes normally immersed in a tank, including flowing a chemical cleaner in pulses through the membranes while the tank water is being drained or is below the level of the membranes, within the meaning of 35 U.S.C. § 103? On this record, we answer this question in the affirmative.

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level

[1] We will limit our discussion to claim 16, the only independent claim presented in the rejection.

of ordinary skill in the art; and (4) secondary considerations. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). "[A]nalysis [of whether the subject matter of a claim would have been obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007) *quoting In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336-37 (Fed. Cir. 2006); *see also DyStar Textilfarben GmBH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1361, 80 USPQ2d 1641, 1645 (Fed. Cir. 2006)("The motivation need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself."); *In re Bozek*, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969)("Having established that this knowledge was in the art, the examiner could then properly rely, as put forth by the solicitor, on a conclusion of obviousness 'from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference.'"); *In re Hoeschele*, 406 F.2d 1403, 1406-07, 160 USPQ 809, 811-812 (CCPA 1969) ("[I]t is proper to take into account not only specific teachings of the references but also the inferences which one skilled in the art would reasonably be expected to draw therefrom . . ."). The analysis supporting obviousness, however, should be made explicit and should "identify a reason that would have prompted a person of ordinary

skill in the art to combine the elements" in the manner claimed. *KSR*, 127 S.Ct. at 1731, 82 USPQ2d at 1389.

The Examiner found that Smith suggests a process of filtering water containing solids that includes backwashing the membrane at least once a week with a cleaning fluid of selected concentration (Answer 4). The Examiner found that draining the tank during the cleaning process was known to persons of ordinary skill in the art (Answer 5). In support of his position, the Examiner cites the Background of the Invention section of the Smith reference. Smith describes flowing a chemical cleaner through the pores in the membrane in pulse cleaning cycles (col. 11, ll. 29-47; and col. 17, ll. 50-56). Smith discloses that NaOCl is a suitable cleaning solution for cleaning filtering membranes (col. 13, ll. 33-41). The Examiner contends that the concentration of NaOCl in the cleaning solution and the duration of all cleaning events are result effective variables that depend upon the degree of fouling of the membrane and the quality of the water being treated by the membrane (Answer 5-6).

Appellants contend that the prior art discussed in the Smith reference does not describe part (c) and parts (e) or (f) of claim 16 (Br. 3). Appellants contend that Smith's process does not describe parts (b) and (c) of claim 16 (Br. 4). Appellants further contend that parts (e) and (f) of claim 16 are not merely the results of optimizing result effective variables in a known process (Br. 4).

Appellants' contentions are not persuasive. The Examiner in the discussion of the rejection has identified the teachings from both the description of the Smith invention and the Background of the Invention

portion of the Smith reference. The Examiner asserts that it would have been obvious to a person of ordinary skill in the art to combine the draining of the tank cleaning technique with the pulse cleaning technique described in Smith. Appellants' contentions do not address the combination as provided by the Examiner. We agree that a person of ordinary skill in the art would have reasonably expected that the pulse cleaning techniques of Smith could have been utilized for cleaning the pores of a membrane in a tank that had been drained for cleaning and subsequently refilled with a cleaning fluid.

Regarding parts (e) and (f) of claim 16, we also agree with the Examiner that a person of ordinary skill in the art would have recognized that the frequency of the cleaning events and the concentration of the cleaning fluid would depend upon the fouling of the membrane. A person of ordinary skill in the art would have sufficient skill to determine the appropriate frequency of cleaning a fouled membrane and an appropriate concentration of a cleaning solution suitable for cleaning a membrane. *See In re Bozek, supra.*

II. Claims 16-25 stand rejected under 35 U.S.C. § 103 as obvious over the combined teachings of Del Vecchio and Smith.

For this rejection, the issue is as follows:

Has the Examiner reasonably determined that a person having ordinary skill in the art would have been led to perform a method for cleaning one or more filtering membranes normally immersed in a tank, including flowing a chemical cleaner in pulses through the membranes while the tank water is being drained or is below the level of the membranes

within the meaning of 35 U.S.C. § 103? On this record, we answer this question in the affirmative.

The Examiner found that Del Vecchio describes a method of cleaning submerged membranes comprising stopping permeation, draining the tank and subsequently flowing a chemical cleaner in pulses through the membrane in a reverse direction to the permeation flow (Answer 7). The Examiner found that Del Vecchio suggests the frequency of cleaning cycles of at least one week. Specifically, Del Vecchio states "[s]uch 'deep cleaning' may be advantageously performed once per month of normal operation or at more or less frequent intervals depending on the needs of the system and the rate at which a bio-film is generated on the fibers" (col. 12, ll. 20-24). The Examiner recognized that Del Vecchio does not teach the cleaning solution specified in the claimed invention. However, the Examiner relied upon Smith for describing NaOCl as a suitable cleaning solution (Answer 7). The Examiner also relied upon Smith for describing the characteristics of the pulse, such as pressure and duration (Answer 7-8).

Appellants contend that Del Vecchio describes deep cleaning which involves a contact time that is preferably several hours long and is contrary to parts (e) and (f) of claim 16 (Br. 6). Appellants' contention is not persuasive. The claimed invention does not set limits on the duration of the cleaning cycle that would exclude the teachings of Del Vecchio.

Appellants' contentions regarding the remaining claims have been considered and are not persuasive for the reasons set forth above and in the Answer.

For the foregoing reasons and those presented in the Answer, the rejections of claims 16-25 under 35 U.S.C. § 103(a) as obvious over (I) Smith and (II) the combined teachings of Del Vecchio and Smith are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

sld/ls

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